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In Response

The Influence of Behavior Analysis on The Surgeon General's Report, *The Health Consequences of Smoking: Nicotine Addiction*

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Behavior analysts have frequently questioned why their work has not exerted greater influence on matters important to the general welfare of our society (e.g., Fraley, 1981; Malagodi, 1986; Stolz, 1981). Such critical self-examination is important for the field. It is also important for the field to acknowledge when behavior analysis does have an impact. Our purpose in writing this response is to note the important influence of behavior analytic research in general and behavioral pharmacology research in particular on the most recent *Annual Report of the Surgeon General on the Health Consequences of Smoking* (U.S. Department of Health and Human Services, 1988).

Cigarette smoking is responsible for more than 300,000 deaths per year in the United States and is the primary cause of preventable death in this country (U.S. DHHS, 1988). The recent Surgeon General's Report represents another important step by the federal government in recognizing and trying to remedy this problem. This report examined the behavioral aspects of smoking, focusing in particular upon the role of nicotine in the establishment, maintenance, and cessation of cigarette smoking.

Insofar as drug dependence is primarily a behavioral phenomenon, it readily lends itself to the extant methods and strategies of behavior analysis (e.g., Goldberg & Stolerman, 1986). Behavioral pharmacology, a discipline within the general field of behavior analysis, has made important contributions to the scientific understanding of drug dependence. The seminal finding in the experimental analysis of drug dependence was that drug self-administration was operant behavior controlled by the reinforcing effects of drugs (Deneau, Yanagita, & Seevers, 1969; Thompson & Schuster, 1964; Weeks, 1962). Drug taking was demonstrated to have broad cross-species generality and to follow the same general laws as other forms of operant behavior (e.g., Griffiths, Bigelow, & Henningfield, 1980; Henningfield, Lukas, & Bigelow, 1986; Thompson & Johanson, 1981; Young & Herling, 1986). Observations that drugs also could function as discriminative and eliciting stimuli (e.g., Overton, 1971; Wikler, 1965, 1973) as well as aversive events (e.g., Goldberg & Spealman, 1982; Spealman, 1979) revealed additional behavioral mechanisms by which drugs could control the behavior of organisms (Thompson, 1984). Drug taking was shown to be orderly and lawfully determined by antecedent and consequent events, and clearly not behavior "out of control." Even so-called subjec-

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tive effects of drugs could be accommodated within a behavior analysis of drug dependence (e.g., Schuster, Fischman, & Johanson, 1981).

Earlier reports of the Surgeon General had focused primarily on the consequences of tobacco use such as lung cancer and cardiovascular disease and, in turn, had relied heavily upon the scientific disciplines of epidemiology, pathophysiology, chemistry, and medicine. However, the 1988 report addressed the following behavioral problem: "Why do people smoke and in other ways consume tobacco products?" (U.S. DHHS, 1988, p. 6). In fact, the primary criteria by which tobacco use was evaluated as a potential form of drug dependence concerned whether or not there was (1) "highly controlled or compulsive use [behavior]" (2) "psychoactive [discriminative] effects" and (3) "drug-reinforced behavior" (U.S. DHHS, 1988, p. 7). Moreover, nicotine was specifically compared to other drugs for their potential to control behavior of humans and nonhumans via the following stimulus functions: "interoceptive or discriminative," "positive reinforcers or rewards," "punishers," "aversive stimuli," and as "unconditioned stimuli" (see pp. 267–269 entitled "How drugs control behavior").

The scientific advances of behavior analysis and behavioral pharmacology provided a conceptual foundation and objective, scientifically valid principles and methods for analyzing drug dependence (Thompson & Johanson, 1981). It was the application of these concepts, principles, and methods to the study of nicotine that generated much of the scientific evidence used by the Surgeon General to declare nicotine an addictive substance.

The Surgeon General's Report (1988) concluded:

1. Cigarettes and other forms of tobacco are addicting.

2. Nicotine is the drug in tobacco that causes addiction.

3. The pharmacologic and behavioral processes that determine tobacco addiction are similar to those that determine addiction to drugs such as heroin and cocaine (p. i).

The criteria used and the conclusions reached in that report are consistent with a behavioral conception of drug dependence. They are also consistent with the more recent behaviorally based definitions of addiction used by the World Health Organization, the National Institute on Drug Abuse, and the American Psychiatric Association (cf. Henningfield, 1988). Such general agreement across these different agencies and professional organizations underscores the influence of the behavioral approach to drug dependence.

Not only has behavior analysis contributed to an objective analysis and definition of drug dependence, but it has also contributed to the treatment and prevention of drug dependence, including cigarette smoking (e.g., Grabowski & Bell, 1983; Grabowski, Stitzer, & Henningfield, 1984; Krasnegor, 1979; U.S. DHHS, 1988). Behavior therapy has become the standard treatment for smoking. For example, the majority of the discussion in the Surgeon General's Report (1988) on nonpharmacological treatments for smoking cessation is devoted to behavioral treatment. Another example is that the package insert for nicotine gum, the only pharmacological intervention for nicotine dependence approved by the Food and Drug Administration, explicitly states it is to be used in conjunction with behavior therapy.

Previous Surgeon General's reports on the consequences of smoking (e.g., 1964, 1968, 1971) have illustrated the power and validity of scientific experimentation and analysis in epidemiology, physiology, chemistry, and related disciplines. The current report demonstrates that research in basic and applied behavior analysis is of no less scientific power, validity, or social relevance.

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